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**MODELING ANALYSIS AND CONTROL OF DYNAMIC SYSTEMS**

**Reading Assignments - Tentative 9/3/02**

**PART 1: Modeling: Given an engineering objective (e.g. design a suspension system) determine the modeling objective, and develop a proper mathematical model.**

<u>DATE</u>	<u>TOPIC</u>	<u>READING ASSIGNMENT</u>
Week #1	Introduction to ME360: Class Mechanics: What is Systems Engineering? What is (Dynamic) Systems Engineering: Modeling? Analysis? & Control? The Art and Science of Abstraction. Proper Models. Automated Modeling.	Handouts Chapter 1 Notes
	Fundamental Concepts and Terminology: Systems, Environments and Boundaries. Energy Conservation & Power Continuity Energy and Power Variables: Mechanical, Fluid and Electrical Domains Bond Graph Notation	Chapter 2 2.1 Notes 2.2
Week #2	Generalized Elements: Sources, Sinks and Resistances Constitutive Laws Energy "Dissipators" Experimental vs. Theoretical Constitutive Laws	2.3 Notes Notes
Week #3	Ideal Machines: Generalized Transformation Transformers and Gytrators Systems: Ideal Source Load Machines	2.4 2.4 2.5
Week #4	Dynamic Systems: Generalized Energy Storage Elements: Inertance and Compliance Generalized Energy Transformation: Junction Structures -0 - & -1-	Chapter 3 3.1,3.2 3.3
Week #5	Causality Differential Equation Formulation Solutions to first order differential equations	3.4 3.4 3.5
Week #6	Solutions to 2nd order differential equations FIRST EXAM	3.5
<b>PART 2: Analysis: Techniques to analyze and simulate models.</b>		
Week #7	Numerical Simulation: 20Sim and MATLAB System Models Circuit "type" models Models with Ideal Machines (motors, pumps etc.)	3.7 4 4.1 4.2 4.2
Week #8	Causality and State Equation Generation State Matrix Notation S-operator and the Laplace Tranform	5 5 5.3/7.2
Week #9	Free and Forced Response 1st & 2nd Order System Response	6.1 Notes
Week #10	Frequency Response Methods	6.2 Notes
Week #11	Transfer Function Expansion Model Validation	6.3
Week #12	SECOND EXAM Frequency Response: Bode Plots "Mechanical" Systems as Filters	6.3
<b>PART 3: Control: Demonstrating how feedback affects system performance.</b>		
Week #13	Open and Closed Loop Feedback Distrubance Rejection, Tracking, Linearization, Stability	8.1
Week #14	Dynamic Compensation: PID controllers Performance Specifications revisited	8.2 notes
FINAL EXAM	Friday, December 13, 2002 from 4:00 pm - 6:00 pm	